

Lidar Remote Sensing of Forests: New Instruments and Modeling Capabilities

Lidar instruments provide scientists with the unique opportunity to characterize the 3D structure of forest ecosystems. This information allows us to estimate properties such as wood volume, biomass density, stocking density, canopy cover, and leaf area. Structural information also can be used as drivers for photosynthesis and ecosystem demography models to predict forest growth and carbon sequestration. All lidars use time-in-flight measurements to compute accurate ranging measurements; however, there is a wide range of instruments and data types that are currently available, and instrument technology continues to advance at a rapid pace. This seminar will present new technologies that are in use and under development at NASA for airborne and space-based missions. Opportunities for instrument and data fusion will also be discussed, as Dr. Cook is the PI for G-LiHT, Goddard's LiDAR, Hyperspectral, and Thermal airborne imager. Lastly, this talk will introduce radiative transfer models that can simulate interactions between laser light and forest canopies. Developing modeling capabilities is important for providing continuity between observations made with different lidars, and to assist the design of new instruments.

Dr. Bruce Cook is a research scientist in NASA's Biospheric Sciences Laboratory at Goddard Space Flight Center, and has more than 25 years of experience conducting research on ecosystem processes, soil biogeochemistry, and exchange of carbon, water vapor and energy between the terrestrial biosphere and atmosphere. His research interests include the combined use of lidar, hyperspectral, and thermal data for characterizing ecosystem form and function. He is Deputy Project Scientist for the Landsat Data Continuity Mission (LDCM); Project Manager for NASA's Carbon Monitoring System (CMS) pilot project for local-scale forest biomass; and PI of Goddard's LiDAR, Hyperspectral, and Thermal (G-LiHT) airborne imager.